

Claims

1. A method of treating a deficiency of a Hedgehog protein in the GI tract, wherein the method comprises providing a source of Hedgehog protein to the GI tract of a  
5 subject suffering from the deficiency of a Hedgehog protein in the GI tract.

2. A method according to claim 1, wherein the source of Hedgehog protein is provided to the GI tract of a subject suffering from the deficiency of a Hedgehog protein for the prophylaxis of carcinogenesis in the GI tract.

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3. A method according to claim 2, wherein the source of Hedgehog protein is provided for the prophylaxis of gastric or colonic cancer.

4. A method according to claim 1, wherein the source of Hedgehog protein is  
15 provided to the GI tract of a subject suffering from the deficiency of a Hedgehog protein for the treatment of a GI tract carcinoma.

5. A method according to claim 4, wherein the GI tract carcinoma is a gastric or colonic cancer.

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6. A method according to any one of claims 1 - 5, wherein the deficiency of a Hedgehog protein is an acquired deficiency of a Hedgehog protein.

7. A method according to any one of claims 1 - 5, wherein subject suffering from  
25 the deficiency of a Hedgehog protein in the GI tract is a subject having been diagnosed with familial adenomatous polyposis coli.

8. A method according to claim 7, wherein the source of Hedgehog protein is administered in an amount effective to prevent or reverse GI tract tumorigenesis in the  
30 subject having been diagnosed with FAP.

9. A method according to claim 7, wherein the source of Hedgehog protein is administered in an amount effective to prevent or reverse colonic adenomatous polyps

and invasive adenocarcinomas, small intestinal adenomas and cancers, and desmoid tumors.

10. A method according to any one of claims 1 - 9, wherein the source of Hedgehog  
5 protein is a pharmaceutical composition comprising a Hedgehog protein.

11. A method according to claim 10, wherein the pharmaceutical composition is suitable for oral administration.

10 12. A method according to any one of claims 1 - 9, wherein the source of Hedgehog is a pharmaceutical composition comprising gene therapy vector, wherein the vector comprises a nucleotide sequence encoding a Hedgehog protein.

15 13. A method according to any one of claims 1 - 9, wherein the source of Hedgehog is a pharmaceutical composition comprising an enteric bacterium, wherein the bacterium comprises a nucleotide sequence encoding a Hedgehog protein, and whereby the nucleotide sequence confers to the bacterium the ability to secrete the Hedgehog protein.

20 14. Use of a Hedgehog protein for the manufacture of a pharmaceutical composition for the treatment of a deficiency of a Hedgehog protein in the GI tract.

15 15. Use of gene therapy vector comprising a nucleotide sequence encoding a Hedgehog protein, for the manufacture of a pharmaceutical composition for the  
25 treatment of a deficiency of a Hedgehog protein in the GI tract.

16. Use of an enteric bacterium comprising a nucleotide sequence encoding a Hedgehog protein, whereby the nucleotide sequence confers to the bacterium the ability to secrete the Hedgehog protein, for the manufacture of a pharmaceutical composition  
30 for the treatment of a deficiency of a Hedgehog protein in the GI tract.

17. A use according to any one of claims 14 - 16, wherein the treatment of the deficiency of a Hedgehog protein in the GI tract is for the prophylaxis of carcinogenesis in the GI tract.

5 18. A use according to claims 17, wherein the treatment of the deficiency of a Hedgehog protein in the GI tract is for the prophylaxis of gastric or colonic cancer.

19. A use according to any one of claims 14 - 16, wherein the treatment of the deficiency of a Hedgehog protein in the GI tract is for the treatment of a GI tract carcinoma.  
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20. A use according to claims 19, wherein the treatment of the deficiency of a Hedgehog protein in the GI tract is for the treatment of gastric or colonic cancer.

15 21. A use according to any one of claims 14 - 20, wherein the deficiency of a Hedgehog protein is an acquired deficiency of a Hedgehog protein.

22. A use according to any one of claims 14 - 20, wherein subject suffering from the deficiency of a Hedgehog protein in the GI tract is a subject having been diagnosed  
20 with familial adenomatous polyposis coli.

23. A use according to claim 22, wherein the source of Hedgehog protein is administered in an amount effective to prevent or reverse GI tract tumorigenesis in the subject having been diagnosed with FAP.  
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24. A use according to claim 23, wherein the source wherein the source of Hedgehog protein is administered in an amount effective to prevent or reverse colonic adenomatous polyps and invasive adenocarcinomas, small intestinal adenomas and cancers, and desmoid tumors.  
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25. A method for diagnosing the status of a subject with respect to GI tract tumorigenesis, the method comprising determining the level of a Hedgehog protein or a Hedgehog mRNA GI tract tissue samples obtained from the subject.

26. A method according to claim 25, wherein the tissue sample is a sample of gastric, esophagic or colonic tissues.

27. A method for diagnosing the susceptibility for development of, or the presence of  
5 ectopic gastric tissue in a subject, whereby the method comprises determining the mRNA or protein level of Hedgehog, BMP2 or BMP4.

28. A gene therapy vector comprising a nucleotide sequence encoding a Hedgehog protein.

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29. An enteric bacterium comprising a nucleotide sequence encoding a Hedgehog protein, whereby the nucleotide sequence confers to the bacterium the ability to secrete the Hedgehog protein.